

## **Seminar**

### **Tomonaga-Luttinger Liquid and Quantum Criticality in Spin-1/2 Antiferromagnetic Heisenberg Chain $C_{14}H_{18}CuN_4O_{10}$ via Wilson Ratio**

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The ground state of a one-dimensional spin-1/2 uniform antiferromagnetic Heisenberg chain (AfHc) is a Tomonaga-Luttinger liquid which is quantum-critical with respect to applied magnetic fields up to a saturation field  $\mu_0 H_s$  beyond which it transforms to a fully polarised state. Wilson ratio has been predicted to be a good indicator for demarcating these phases [1]. In this talk, I present detailed temperature and magnetic field dependent magnetisation, magnetic susceptibility and specific heat measurements in a metalorganic complex  $C_{14}H_{18}CuN_4O_{10}$  and compare the experimental results with quantum transfer matrix and field theory calculations to show that the complex is a very good realisation of a spin-1/2 AfHc. We used Wilson ratio to map the complete magnetic phase diagram of the uniform spin-  $\frac{1}{2}$  AfHc showing the quantum critical cone very clearly over large regions of phase space, the first clear demonstration of such a cone experimentally. Tomonaga-Luttinger liquid as well as fully polarised states have also been demarcated. Luttinger parameter and spinon velocity were found to match very well with the values predicted from conformal field theory.

#### **References:**

1. Feng He, Yuzhu Jiang, Yi-Cong Yu, H-Q Lin, and Xi-Wen Guan. Quantum criticality of spinons, Phys. Rev. B 96, 220401 (2017).
2. Sharath Kumar Channarayappa, Sankalp Kumar, N. S. Vidhyadhiraja, Sumiran Pujari, M. P. Saravanan, Amal Sebastian, Eun Sang Choi, Shalinee Chikara, Dolly Nambi, Athira Suresh, Siddhartha Lal and D. Jaiswal-Nagar, Proc. Nat. Acad. Sci. Nexus (Accepted).

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**16:00 Hrs (Tea / Coffee 15:45 Hrs)**

**Seminar Hall, TIFR-H**